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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,476	09/15/2003	Marc Ferrato	Q77425	9244

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EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 11/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/661,476	FERRATO ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-10 and 12-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 4 and 11 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 27, 2005 has been entered.

As requested by the submission of October 27, 2005, the after final amendment of October 7, 2005 has been entered and considered. After entry of that amendment, claims 4 and 11 are canceled, and claims 1-3, 5-10 and 12-15 are present for examination.

Claim Rejections - 35 USC § 112

2. The rejection of claim 11 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn due to applicant's amendment of October 7, 2005 to remove the material described as new matter by the Examiner.

3. The rejection of claims 1-14 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement is withdrawn due to applicant's amendment of October 7,2005 to remove the material described as non-enabled by the Examiner.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-3, 5-8, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultze et al (US 4460529) in view of Knudsen et al (US 5273699) and the admitted state of the prior art.

Schultze teaches a method of fabricating a substrate that can be an aluminum nitride substrate. Column 1, lines 60-68 and column 2, lines 40-55. The substrate is obtained by spraying a powder onto a support at a high temperature and a high speed. Column 2, line 40 through column 3, line 40 (the plasma spraying). The powder can include AlN grains. Column 2, lines 40-55. Schultze teaches that the process can replace conventional processes such as dry pressing, wet extrusion, slip molding, isostatic pressing, hot pressing, and injection pressing, whereby a ceramic powder is processed and then undergoes high temperature sintering. Column 1, lines 15-35.

Claim 2: the powder can be sprayed by a plasma torch (plasma spraying). Column 3, lines 15-30.

Claim 8: the substrate can be obtained by providing a plurality of passes over the support as a function of the required thickness. Column 5, lines 20-30.

Claim 10: the substrate can be heated after spraying, thus providing the "annealing". Column 4, lines 55-60.

Claim 15: the support can be provided with an "attachment" layer as claimed prior to the thermal spraying. See column 4, lines 30-40 (non-metallic mold cores with al layer of Teflon, for example, can be provided, and without the layer the coating would not apply to the support as the support would be burned up).

Schultze teaches all the features of these claims except (1) the use of the oxide precursor, (2) spraying with an oxyacetylene torch (claim 3), (3) the specific formation of

the powder and the materials used (claims 1 and 5-7) and (4) that the substrate can be used as a support for electronic components.

However, Knudsen teaches a method of forming an aluminum nitride powder. Abstract. Knudsen teaches that it is desirable to make the powder moisture resistant by treating with a yttrium containing compound, thus preventing storage problems for the powder. Column 2, lines 5-20 and 35-45. The yttrium compound can be a rare earth oxide precursor, such as yttrium isopropoxide. Column 3, lines 10-20. The compound can be applied to the aluminum nitride powder by (1) dissolving the yttrium compound in an organic solvent forming a solution, (2) then dispersing fine pure AlN powder in the solution with vigorous agitation to form a suspension, (3) then atomizing the suspension in an inert atmosphere (vacuum, for example) to obtain the treated powder. Column 3, line 15 through column 4, line 10 and column 5, line 65 through column 6, line 10. The treated powder can contain yttrium oxide in an amount of 0.1 to 10 % by weight of the aluminum nitride. Column 3, lines 5-15. The solvent can be isopropanol (which would be form of propanol). Column 3, lines 45-50.

The admitted state of the prior art, at page 2 of the specification, indicates that AlN substrates are widely used to support powder electronic components.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schultze to use the treated aluminum nitride powder as taught by Knudsen, in order to provide a desirable substrate using a moisture resistant powder, because Schultze teaches the desire to form aluminum nitride articles by

plasma spraying aluminum nitride powder, and Knudsen teaches that a desirable moisture resistant aluminum nitride powder can be formed by treating with yttrium oxide precursor. It would have been inherent when plasma spraying such a powder that the oxide precursor would have yielded an oxide, given the high heat of the plasma spraying. It would further have been obvious to modify Schultze in view of Knudsen to use a flame spraying oxyacetylene torch to replace the plasma torch with an expectation of desirable spraying results, because Schultze teaches thermal spraying and it is the Examiner's position that it is well known in the thermal spraying art that plasma and flame spraying with an oxyacetylene torch are both well known desirable methods of thermal spraying. It would further have been obvious to modify Schultze in view of Knudsen to perform routine experimentation to optimize the amount of yttrium oxide content from the range taught by Knudsen of 0.1 to 10% by weight, given the desire to use the best amount for the particular purpose of applicant. It would further have been obvious to modify Schultze in view of Knuden to use yttrium isopropionate as the oxide precursor, with an expectation of desirable protective results, because Knudsen teaches the use of yttrium compounds that convert to oxides (column 3, lines 10-20) and it is the Examiner's position that isopropionates are well known oxide precursor compounds in the chemical art. It would further have been obvious to modify Schultze in view of Knudsen to further use the formed aluminum nitride article as a support for electronic components as suggested by the admitted state of the prior art in order to provide desirable electronic components, as Schultze in view of Knudsen provides a

thin aluminum nitride article, and the admitted state of the prior art teaches the use of formed aluminum nitride articles as supports for electronic components.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schultze in view of Knudsen and the admitted state of the prior art as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Okano et al (US 5045365).

Schultze in view of Knudsen and the admitted state of the prior art teaches all the features of this claim except the cooling of the support by compressed air while spraying. Schultze does teach that the support can be metal. Column 4, lines 20-35. Schultze also teaches cooling the support during spraying. Column 2, line 65 through column 3, line 5 and column 3, line 65 through column 4, line 10.

However, Okano teaches that when coating an article to be thermally sprayed, the conventional method is to spray compressed air on the back of the substrate surface. Column 3, lines 1-20.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schultze in view of Knudsen and the admitted state of the prior art to use compressed air for cooling as taught by Okano, in order to provide a desirable cooling of the substrate without having to use liquid, because Schultze in view of Knudsen and the admitted state of the prior art teaches the thermal spraying of a cooled support, and Okano teaches that when thermal spraying a cooled support, a conventional well known method of cooling is by compressed air.

8. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schultze in view of Knudsen and the admitted state of the prior art as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Dittrich et al (US 3617358).

Schultze in view of Knudsen and the admitted state of the prior art teaches all the features of these claims except the particle formation features and particle sizes.

However, Dittrich teaches making flame spray powders where finely divided material is suspended in liquid, the suspension is atomized and the atomized suspension is dried to form a flame spray powder. Column 1, line 75 through column 2, lines 10. The initial particle sizes can be between 1 and 15 microns. See column 2, lines 5-10 and column 3, lines 40-45. For example, the particle size can be approximately 3 microns. Column 17, lines 60-70. After the atomization and drying, the formed particles can be formed with diameters in the range of 140 mesh to 325 mesh (106 to 45 microns). Column 18, lines 30-45, for example. The formed powder is then screened to use particles of the desired size for spraying, such as 200-325 mesh (75-45 microns). Column 18, lines 55-60. The particles formed can also be hollow. Column 19, lines 5-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Schultze in view of Knudsen and the admitted state of the prior art to use initial and final particle sizes, and to use hollow spheres as taught by Dittrich, in order to provide a thermal spray powder, because Schultze in view of Knudsen and the admitted state of the prior art teaches the thermal spraying of formed

AlN powders, with Knudsen teaching a liquid dispersion and spray atomization to form AlN powders, and Dittrich teaches to form liquid dispersions of particles and spray atomize to form thermal spray powders, and that when doing so it is desirable to start with fine powders, such as in the 3 micron size range, which are agglomerated by the spray atomization and drying to form larger particles, such as 45-106 micron in size range, and to further screen the powder to the size desired for thermal spraying. Dittrich further teaches that hollow spheres can be formed, and it would have been obvious to one of ordinary skill in the art that such hollow spheres would also be screened as desired to form a specific coating, given the teaching of Dittrich to screen formed powders to get those desired for thermal spraying.

9. Claims 1-3, 5-8, 10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breit et al (US 4460529) in view of Knudsen et al (US 5273699).

Breit teaches a method of fabricating a substrate that can be an aluminum nitride substrate for use as a support for electronic components. Column 2, lines 5-20 and figures 2-3. The substrate is obtained by spraying a powder onto a support at a high temperature and a high speed. Column 4, lines 5-65 (the plasma spraying). The powder can include AlN grains. Column 5, lines 35-50. After the substrate is formed, circuits, etc. are applied, fired and then the ceramic layer is sealed to exclude moisture. Column 2, lines 25-35.

Claim 2: the powder can be sprayed by a plasma torch (plasma spraying). Column 4, lines 10-65.

Claim 3: other thermal spraying processes can be used. Column 4, lines 10-15.

Claim 8: the substrate can be obtained by providing a plurality of passes over the support as a function of the required thickness. Column 4, lines 35-40.

Claim 10: the substrate can be fired after spraying, thus providing the "annealing". Column 5, lines 1-20 and column 2, lines 25-35.

Claim 15: the support can be provided with an "attachment" layer as claimed prior to the thermal spraying. See column 2, lines 1-10 (the laminate of layers of the substrate).

Breit teaches all the features of these claims except (1) the use of the oxide precursor, (2) spraying with an oxyacetylene torch (claim 3), (3) the specific formation of the powder and the materials used (claims 1 and 5-7) and (4) that the substrate can be used as a support for electronic components.

However, Knudsen teaches a method of forming an aluminum nitride powder. Abstract. Knudsen teaches that it is desirable to make the powder moisture resistant by treating with a yttrium containing compound, thus preventing storage problems for the powder. Column 2, lines 5-20 and 35-45. The yttrium compound can be a rare earth oxide precursor, such as yttrium isopropoxide. Column 3, lines 10-20. The compound can be applied to the aluminum nitride powder by (1) dissolving the yttrium compound in an organic solvent forming a solution, (2) then dispersing fine pure AlN powder in

the solution with vigorous agitation to form a suspension, (3) then atomizing the suspension in an inert atmosphere (vacuum, for example) to obtain the treated powder. Column 3, line 15 through column 4, line 10 and column 5, line 65 through column 6, line 10. The treated powder can contain yttrium oxide in an amount of 0.1 to 10 % by weight of the aluminum nitride. Column 3, lines 5-15. The solvent can be isopropanol (which would be form of propanol). Column 3, lines 45-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit to use the treated aluminum nitride powder as taught by Knudsen, in order to provide a desirable substrate using a moisture resistant powder, because Breit teaches the desire to form aluminum nitride articles by plasma spraying aluminum nitride powder, and Knudsen teaches that a desirable moisture resistant aluminum nitride powder can be formed by treating with yttrium oxide precursor. It would have been inherent when plasma spraying such a powder that the oxide precursor would have yielded an oxide, given the high heat of the plasma spraying. It would further have been obvious to modify Breit in view of Knudsen to use a flame spraying oxyacetylene torch to replace the plasma torch with an expectation of desirable spraying results, because Breit teaches thermal spraying of various forms can be used and it is the Examiner's position that it is well known in the thermal spraying art that plasma and flame spraying with an oxyacetylene torch are both well known desirable methods of thermal spraying. It would further have been obvious to modify Breit in view of Knudsen to perform routine experimentation to optimize the

amount of yttrium oxide content from the range taught by Knudsen of 0.1 to 10% by weight, given the desire to use the best amount for the particular purpose of applicant. It would further have been obvious to modify Breit in view of Knuden to use yttrium isopropionate as the oxide precursor, with an expectation of desirable protective results, because Knudsen teaches the use of yttrium compounds that convert to oxides (column 3, lines 10-20) and it is the Examiner's position that isopropionates are well known oxide precursor compounds in the chemical art.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breit in view of Knudsen as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Okano et al (US 5045365).

Breit in view of Knudsen teaches all the features of this claim except the cooling of the support by compressed air while spraying. Breit does teach that the support can be metal. Column 1, lines 60-68.

However, Okano teaches that when coating an article to be thermally sprayed, the conventional method is to spray compressed air on the back of the substrate surface. Column 3, lines 1-20.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit in view of Knudsen to use compressed air for cooling as taught by Okano, in order to provide a desirable cooling of the substrate without having to use liquid, because Breit in view of Knudsen teaches the thermal

spraying of a metal support, and Okano teaches that when thermal spraying a support, it is conventional to cool the support by compressed air.

11. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breit in view of Knudsen as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Dittrich et al (US 3617358).

Breit in view of Knudsen teaches all the features of these claims except the particle formation features and particle sizes.

However, Dittrich teaches making flame spray powders where finely divided material is suspended in liquid, the suspension is atomized and the atomized suspension is dried to form a flame spray powder. Column 1, line 75 through column 2, lines 10. The initial particle sizes can be between 1 and 15 microns. See column 2, lines 5-10 and column 3, lines 40-45. For example, the particle size can be approximately 3 microns. Column 17, lines 60-70. After the atomization and drying, the formed particles can be formed with diameters in the range of 140 mesh to 325 mesh (106 to 45 microns). Column 18, lines 30-45, for example. The formed powder is then screened to use particles of the desired size for spraying, such as 200-325 mesh (75-45 microns). Column 18, lines 55-60. The particles formed can also be hollow. Column 19, lines 5-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit in view of Knudsen to use initial and final particle sizes, and to use hollow spheres as taught by Dittrich, in order to provide a thermal

spray powder, because Breit in view of Knudsen teaches the thermal spraying of formed AlN powders, with Knudsen teaching a liquid dispersion and spray atomization to form AlN powders, and Dittrich teaches to form liquid dispersions of particles and spray atomize to form thermal spray powders, and that when doing so it is desirable to start with fine powders, such as in the 3 micron size range, which are agglomerated by the spray atomization and drying to form larger particles, such as 45-106 micron in size range, and to further screen the powder to the size desired for thermal spraying. Dittrich further teaches that hollow spheres can be formed, and it would have been obvious to one of ordinary skill in the art that such hollow spheres would also be screened as desired to form a specific coating, given the teaching of Dittrich to screen formed powders to get those desired for thermal spraying.

12. Kobayashi et al (US 2002/0109153 A1) also teaches an aluminum nitride article formed by thermal spraying as a substrate for electronic components. See figure 2 and paragraph [0051] - [0055].

Response to Arguments

13. Applicant's arguments with respect to claims 1-3, 4-10 and 12-15 have been considered but are moot in view of the new ground(s) of rejection.

As to the use of Schultze in view of Knudsen, the Examiner has further provided the use of the admitted state of the prior art as to the formation of a support for

electronic components. The Examiner has also provide new rejections using Breit as to the formation of a support for electronic components using thermally sprayed aluminum nitride.

As to arguments raised as to the use of Knudsen, see pages 5-6 of the October 7, 2005 amendment, the Examiner notes that as to the step of atomizing the dispersed AlN powder in solvent, Knudsen teaches such a step. As shown at column 3, lines 20-27 the slurry of aluminum nitride powder, yttrium containing compound and solvent is mixed and then in step (b) the solvent is removed to form the treated powder. As column 3, lines 64-68, it is noted that the solvent can be removed from the slurry by various processes including using a "spray drier" which would provide atomizing (note the showing of a spray drying process in the cited reference to Dittrich above). As to the provision of an inert atmosphere, it is also noted that the solvent can be removed in vacuum (see column 3, lines 64-68 and column 6, lines 5-10). As to the spraying of the resulting powder, this is suggested by the reference to Schultze or Breit. As to the suggestion to use a moisture resistant powder, Knudsen indicates that such a powder prevents a problem with storing powder for use (column 2, lines 5-15). This problem of storage would occur with any process for making a ceramic article from aluminum nitride.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER